



## TECHNICAL BULLETIN

March–April 1990

Issue 9

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Annual Subscription: \$129

# Overview: Disk Caching

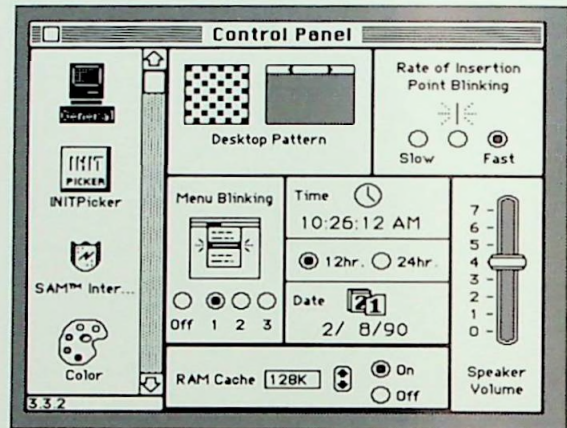
The time it takes a hard disk to fetch and retrieve requested data can be described by a variety of measures, such as average seek time and data interleave. However, speed is always limited by the physical facts: A disk drive is a fast-spinning platter with a flying recording head that looks for specific bytes among millions of bytes. RAM, on the other hand, has no moving parts, and fetch and retrieval functions are performed so much faster that access speeds are measured in nanoseconds instead of milliseconds.

Using the speed of solid state RAM to alleviate common data bottlenecks, the Macintosh operating system's RAM Cache can allocate (via the Control Panel) an area in RAM for storing the contents and results of a previous hard disk search. The cache provides an alternate area for the system to check before going to disk. During subsequent searches, if the system finds requested information in the cache, a disk search is not required, saving potential hard disk seek time and speeding up the retrieval process.

Operations that require repetitive pieces of information to be loaded and unloaded are ideal for cache storage. Because the Apple® Macintosh® computer's operating system builds and runs its applications by loading and unloading resources in small, discrete chunks of code, it is an ideal system for caching. However, operations that require accessing large chunks of information spread out unevenly over the hard disk defeat the purpose of a cache. Large word processing or database systems may actually slow down performance because the system must check both the user-definable RAM Cache and the disk buffer. If your system runs slowly when you use such programs, turn off the RAM Cache option, which is located in the Macintosh Control Panel.

The Control Panel allows you to set a RAM Cache value from 32K to 4096K, depending on the amount of memory in your system. Note that the memory you devote to cache is not available for your system

memory. A common mistake of new users is to allocate a 512K cache in a 1-megabyte system, a choice that severely constrains normal system performance.

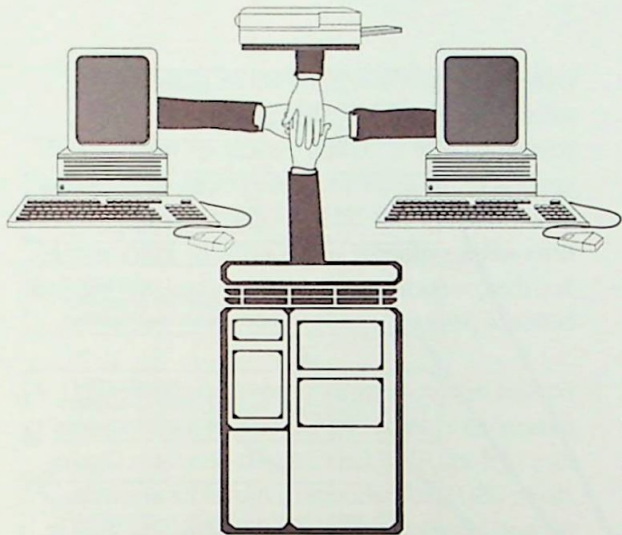


There is no rule of thumb about cache settings. While values from 32K to 192K have been used successfully in 1-megabyte systems, there is diminishing value in going much beyond 192K in any size system. You can experiment with different settings to arrive at a balance between usable system memory and best hard disk performance.

Remember that your available system memory is a limited and finite resource. In certain cases, you may get better performance if you don't use RAM caching. With some memory-hungry applications—such as desktop publishing programs and complex relational databases—a cache may have no net effect, or may even slow down the system. When you use HyperCard® software or the AppleShare® File Server, for example, there is no advantage in having the RAM Cache on, because both these applications have their own internal caching systems. AppleShare overrides these settings automatically. HyperCard, however, isn't able to override cache settings, and you may reduce the system memory available for HyperCard, impacting its performance or preventing it from being used at all.



# Introduction to Protocol Conversion



- Transport services are lower-level network functions that manage addressing and other transmission control tasks.
- Connection services are the lowest-level network functions. These govern the actual, physical transmission from one computer's memory onto the network, and then into the destination computer.

To understand the kinds of behaviors prescribed by protocols, consider the things that a device on a network might do while performing a typical task such as sending an electronic mail message.

*The information in the article is taken from Understanding Computer Networks, authored by Apple Computer and part of the Apple Communications Library, which provides a comprehensive summary of the Apple networking and communications environment from the introductory to the highly technical level. Published by Addison-Wesley, the library is available at many computer stores and bookstores.*

Network protocols are the rules that network devices must follow to interact with one another successfully. A hierarchy of protocols governs communication; when two applications communicate, each has an underlying framework of controlling software that makes their dialogue possible. In any network architecture, protocols must exist that define three general classes of functions:

- Application services are the highest-level network functions. They enable an application program to communicate with an equivalent program on another computer.

## User:

Starts the electronic mail program

Types a new message

Sends the message

## Network software:

- Determines the address of the network server
- Sends the server a request for a list of new messages
- Sends a list of messages from the server to the user's address

- Appends the destination to the message and enters the message destination

The workstation sends the information to the server; the server translates the addressee's name into a network address. Then the software:

- Formats the message packets with sender and destination addresses
- Transmits the message through the network connection
- Ensures that the message arrives at the mail server device without error

The example on the preceding page includes some of the more visible activities governed by protocols. To perform each of these tasks, additional protocols are required to do the following things:

- Control access to the network
- Identify the user's address to the server
- Establish a communication session between the devices
- Make sure the information is transmitted in the appropriate format

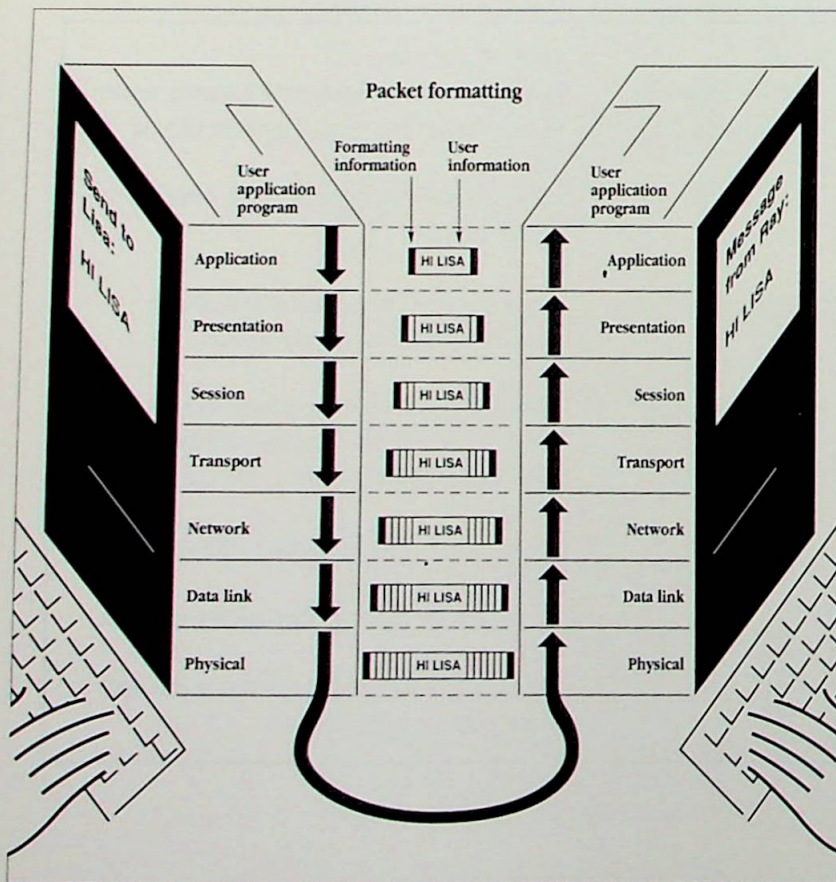
Different protocols deal with tasks that occur at different levels of network operations: Some are concerned with acquiring commands from the user application, as in the example; others, with making sure the devices are aware of one another and responding properly; and still others, with controlling the connection to the network and moving data between devices.

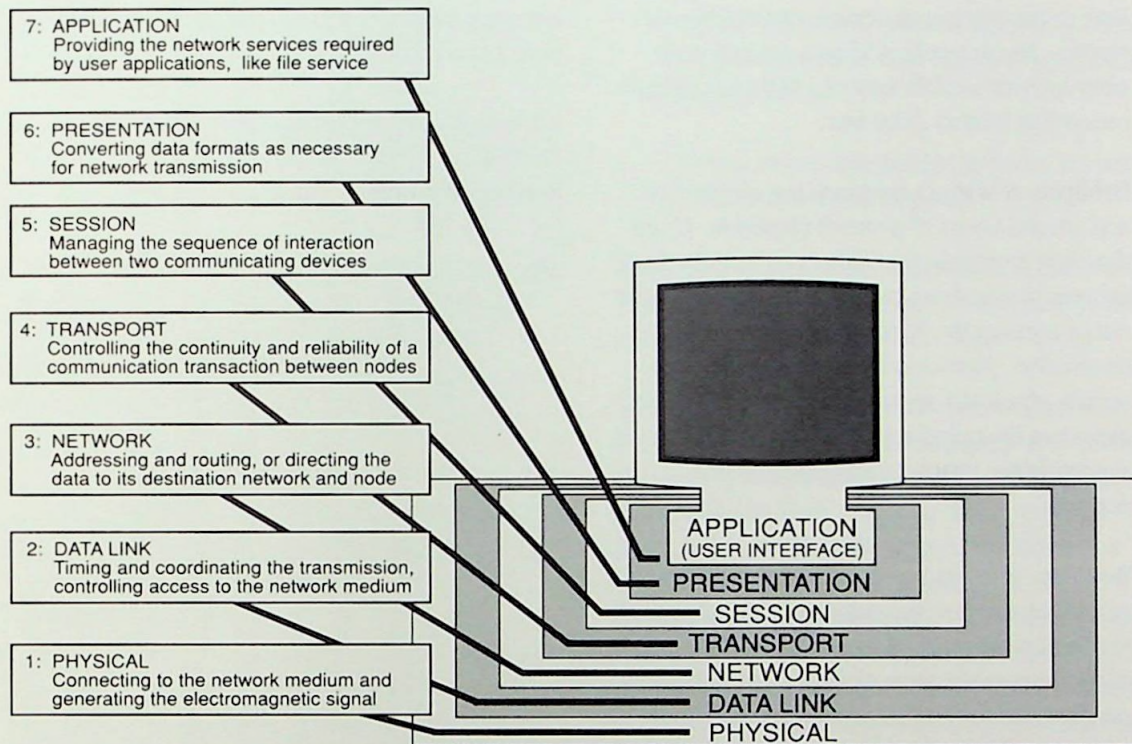
For this reason, network protocols are generally referred to in terms of the levels, or *layers*, of activity they perform. The International Standards Organization (ISO) has published a model for layered network protocols that has become widely used in describing and comparing different network protocol architectures.

The ISO model is called the Open Systems Interconnection (OSI) reference model. It is described here briefly to illustrate how a hierarchy of network functions can be represented by separate layers of protocols. Note that the hierarchy ranges from the physical hardware functions of the network at its lowest layer up to the more user-oriented functions at the highest layer. (See the chart on page 5.) These are also referred to as *low-level* and *high-level* functions.

### The ISO/OSI Model

Information moving from one computer to another begins at the highest layer in the conceptual hierarchy of protocols—the application layer—and moves through successively lower layers to the physical layer—where the actual transmission takes place—and then, in the receiving computer, moves from the physical layer back up to the application layer.





What is actually taking place is that at each layer, there is a software module that implements certain network functions according to corresponding protocol specifications. When sending data, a packet of information is passed along from one software module to another, and at each point acquires some additional formatting or addressing that is necessary for the packet to be transmitted through the network.

At the receiving end, the packet passes through the layers in the reverse order. At each stage, a software module corresponding to the module on the sending device reads the formatting information, strips it away, and passes the packet up to the next layer. The user information ultimately reaches the receiving application program in its original form.

### Connecting Networks

Four kinds of devices are used to connect computer networks: repeaters, bridges, routers, and gateways. These connection devices can best be described in terms of the hierarchy of network functions, as they perform functions that may involve one or more of the protocol layers.

- **Repeaters:** A repeater is used when a network cable needs to be extended beyond its recommended maximum length or maximum number of devices. A signal weakens as it travels through the network cable. The repeater amplifies and retransmits the signal. The repeater can extend the distance covered by a network cable and thereby increase the physical

limit to the number of devices that can be connected. For example, adding a repeater to a network with a cable limit of 1,000 feet might increase that limit to 2,000 feet.

- **Bridges:** A bridge's functions involve the first and second layers of network protocols. Using data link protocols, the bridge can read the node address attached to a packet and selectively filter out or transmit the packet depending on its destination. Networks connected by a bridge remain physically separate entities, governed by their own limits and capacities, but to devices on the rest of the internet they appear as one network.
- **Routers:** A router is used in internets where more selective decision-making intelligence is required at the point of connection. The router allows connected networks to remain fully independent and to retain separate identities and addresses. The router is aware of the other networks and routers in the internet and can select the most efficient path to the data's intended destination. This ensures faster traffic flow and can automatically provide for detours if a connection is broken along the path.
- **Gateways:** Of all connection devices, gateways use the greatest range of networking protocols because they serve as translators between different kinds of network protocol architectures. A gateway is not necessarily used to make a network larger; its primary purpose is to overcome differences between connected networks. The gateway interprets network-related information in a data transmission, such as addressing and routing instructions, then translates these and the message content into the format of the other protocol, and retransmits the data onto that network.

For more information about the Apple Communications Library, contact:

Addison-Wesley Publishing Company  
Jacob Way  
Reading, MA 01867  
(617) 944-3700



# MacroMind Products: Movies in HyperCard

*Thanks to MacroMind for providing details about its products.*

A number of products from MacroMind allow you to combine color animated sequences with your HyperCard stacks.

MacroMind Director is a multimedia application that allows you to combine text, graphics, animation, audio, and video images into movies for sales presentations, education and training, engineering prototypes and scientific project simulations, and desktop video production.

A companion product, the MacroMind Accelerator, creates a playback-only version of a Director movie, smoothing out and speeding up the playback of complex movies.

MacroMind Director includes the MacroMind Player, a utility program for playing movies as stand-alone applications or from within HyperCard. The MacroMind Player features a PlayMovie command that allows you to play a Director movie—in color and variable screen size—from a HyperCard stack. PlayMovie also allows you to set options such as movie tempo, number of repeats, indefinite loop, frame range, and preload into RAM. With the Player comes a stack containing a PlayAccel command for playing accelerated movies from within HyperCard.

Player XCMDs furnish these other commands for managing the playback of movies:

- ClipMovie “clips” a movie to a user-defined rectangle on the screen. Only the part of the movie within the rectangle plays; the rest of the screen is left alone.
- SetScreenMovie specifies the size and location of the screen area.
- DrawPICT displays a color or black-and-white PICT file in the same way that PlayMovie displays a Director movie.
- GetFrameMovie determines the frame at which a preloaded movie has stopped.

When used as a stand-alone application, the MacroMind Player can create a Projector that plays a defined sequence of Director and Accelerator movies.

MacroMind has announced an enhanced product that will ship in spring 1990. Called MacroMind Director Version 2.0, it includes a scripting language that provides interactivity and control over external devices such as CD-ROM players, videodiscs, or frame-to-frame videotape recorder controllers. Director Version 2.0 supports 24-bit graphics and animation, and you can easily add buttons to navigate among frames or movies. You can also use Macintosh Toolbox calls to build applications with windows, check boxes, and radio buttons. Designed for presentations, visualization and interactive simulations, kiosks and reference stations, training, and desktop video production, Director 2.0 includes a new version of the Player utility.

The MacroMind Player can be licensed for distribution with multimedia productions. A flat licensing fee of \$250 is required for each commercial application project—defined as “significant changes made to the content of an existing application.” Licensing of the MacroMind Player is free of charge for educational and noncommercial use.

For further information, contact MacroMind at the following address:

MacroMind, Inc.  
410 Townsend, Suite 408  
San Francisco, CA 94107  
(415) 442-0200



# SuperMac Technology: New Color Cards and Monitors

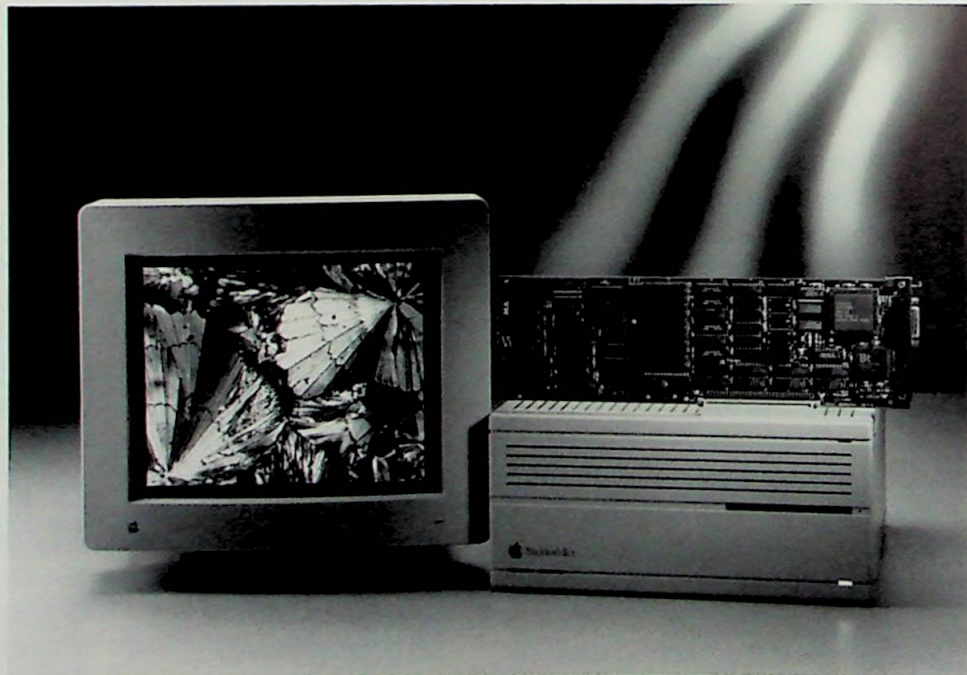
*Thanks to SuperMac Technology for providing details about its products.*

SuperMac Technology offers a range of graphics subsystems for monochrome, gray-scale, and color products, including low-cost monochrome display adapters and monitors for the Macintosh SE, as well as high-performance, 24-bit color display subsystems for the Macintosh SE/30 and the Macintosh II family.

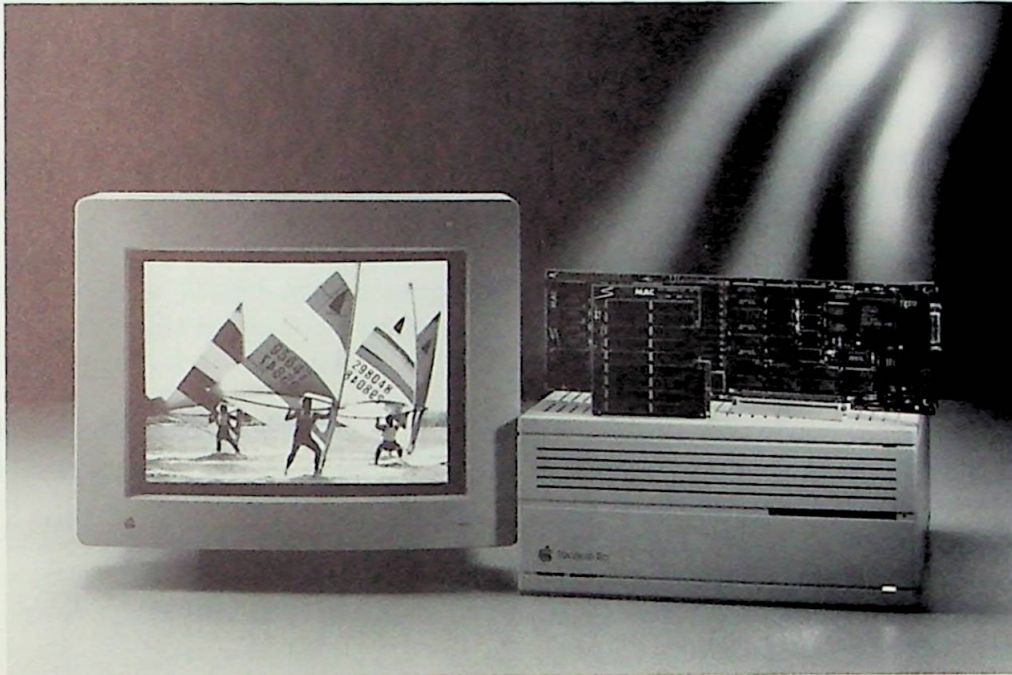
Last fall, SuperMac introduced the Graphics Accelerator—which allows users to manipulate 32-bit QuickDraw™ images up to 20 times faster than with a standard 24-bit color display card—and two new 19-inch color monitors that support the Apple-standard 75-Hz vertical refresh rate, which completely eliminates screen flicker.

Following are descriptions of the new products:

- **Spectrum/24 Series III.** This 24-bit color display card features acceleration and flicker-free graphics for the Macintosh II family. It supports the new SuperMac color monitors at 75 Hz, and it also supports a vertical refresh rate of 60 Hz to allow greater flexibility in choice of monitors. The Graphics Accelerator, built into the board, speeds up all 32-bit QuickDraw operations and drawing commands—including scrolling, fills, moves, windows, ovals, lines, and rectangles. Because the accelerator is located on the display card, it does not require an extra NuBus™ slot.
- **Spectrum/8 Graphics Card.** This 8-bit color display card supports both 60-Hz and 75-Hz vertical scan rates, and displays 1,024 by 768 pixels



*Spectrum/24 Color Card*



*Color Card/24 and Graphics Accelerator*

and 256 colors or shades of gray at 72 dots per inch, conforming to the Apple WYSIWYG standard.

- **ColorCard/24 and Graphics Accelerator for ColorCard/24.** The ColorCard/24 display card is a low-cost option for upgrading any Macintosh to 24-bit color display. The card supports the AppleColor™ High-Resolution RGB Monitor at a resolution of 640 by 480 pixels on any Macintosh II model. The Graphics Accelerator, an enhancement module for the ColorCard/24, plugs directly onto the card, avoiding the need for an extra NuBus slot. Because the Graphics Accelerator is a separate module, owners of the card can upgrade without having to buy a new card.

The SuperMac graphics cards offer the following standard features:

- Virtual Desktop. The cards enable any monitor to display a virtual viewing area of more than 4,000 by 1,500 pixels, or 8 square feet—the largest usable viewing area available.
- Hardware pan and zoom. Spectrum/24 and Spectrum/8 users can move around the Virtual Desktop area by moving the mouse. A user-definable keyboard command provides 200 percent magnification of the screen image. Such hardware features offer faster response than standard software implementation.
- SuperVideo software. Through the Control Panel, users can configure the size of the Virtual Desktop, select the monitor to which

the card is connected, enable or disable panning and zooming, and assign custom key sequences to activate pan and zoom. SuperVideo also provides automatic centering of dialog boxes and a menu bar lock feature that displays the menu bar on the screen regardless of the current position on the desktop.

- **19-inch Trinitron Color Display and 19-inch Color Display.** The new monitors offer flicker-free display with a 75-Hz refresh rate, and include a bonded optical panel that reduces screen glare and enhances contrast. The 19-inch Trinitron Color Display is a new version of SuperMac's existing Trinitron monitor, enhanced to offer the 75-Hz vertical refresh rate. The 19-inch Color Display features new gun technology and focus circuitry to improve conventional RGB display.

For further information, contact SuperMac at the address below:

SuperMac Technology  
485 Potrero Avenue  
Sunnyvale, CA 94086  
(408) 245-2202



# WDEF: Rx for a New Virus



In December 1989, it became clear that someone had unleashed a new computer virus on the Macintosh world: WDEF. Earliest reports came from Belgium, Northwestern University, and the University of Texas.

WDEF's mode of replication is to spread itself from disk to disk by infecting each disk's or mounted volume's Desktop file. WDEF is unique among Macintosh viruses in that it spreads itself simply through insertion of a disk containing it.

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## WDEF Symptoms

Don't panic—WDEF is not usually destructive. Its basic activity is to propagate itself from disk to disk. It does, however, cause some problems:

- Due to a bug in the virus itself, infected Macintosh IIci, Macintosh IIfx, and Macintosh Portable computers tend to crash frequently.
- WDEF can cause performance problems on AppleTalk® networks and AppleShare servers. It slows things down because it takes up processing time.
- Crashes occur frequently when saving files while running an application under MultiFinder®.
- WDEF can affect the display of fonts, particularly those in Outline style.
- Several users have reported some disk damage.
- When infected, Macintosh systems with 8 megabytes of memory have a tendency to crash.
- The "Virtual" INIT from Connectix doesn't work when WDEF is present.

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## How WDEF Invades Desktop Files

Here's how it works. If the Finder™ is the current application, or if MultiFinder is running, the Finder opens the Desktop file of a volume as it is mounted. This makes the WDEF viral resource the active window definition procedure, so that the virus can move freely onto other mounted volumes. As a result, you don't have to run a program to bring on the infection; just inserting an infected disk in a drive can transmit it.

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## Fighting Back

Because at least two strains of WDEF have been found, always use the most recent antivirus software. This gives you the best chance of having software that was modified to fight the most recent viral strains. The following four virus-fighting packages detect WDEF:

- VirusRX™ 1.6 from Apple is a virus detection tool, and will not prevent a machine from becoming infected. It is available on various on-line services, such as CompuServe, GENie, Delphi, BIX, MacNet, and America Online (formerly AppleLink—Personal Edition), and through other popular sources for free and shareware software.
- The freeware Disinfectant 1.6 protects against both strains of WDEF and also detects similar types of viruses. It also is available on various on-line services for free and shareware software.
- Symantec's SAM 1.5 detects both WDEF strains and other similar viruses.

- With modification, the shareware Virus Detective 3.1 can also detect the virus. Add the following search string to the program:

Creator=ERIK & Resource WDEF & Any

If you get a match for this string, click the Remove button to remove the virus. Virus Detective can only repair WDEF infections, and it works only if you are not using MultiFinder.

WDEF is a clever piece of work; clever enough that it slips past all of the following INITs and utilities: Vaccine 1.0.1, GateKeeper 1.1.1, SAM Intercept 1.10, Virex INIT 1.12, Disinfectant 1.3, VirusRX 1.5, SAM Virus Clinic 1.10, and Virex 2.2.

### Testing for Infection with ResEdit

You can test for the virus in a Desktop file by running the ResEdit™ application. Follow these steps:

1. Start your Macintosh from the Finder, *not* from MultiFinder.
2. Start ResEdit.
3. Insert the floppy disk that you want to test.
4. Open the Desktop file.
5. If the file contains a WDEF resource, you know it's infected. (Note: The Desktop file should never have a WDEF resource.)

To remove the virus, rebuild the Desktop file, as described below.



### Rebuilding the Desktop File

If you don't have any of the above-mentioned antiviral utilities, you can still protect your system. The key is to rebuild the Desktop file of each disk as soon as you insert it, and thus keep the virus from activating. Here's how to do it:

1. Make sure the current application is the Finder. If you're running MultiFinder, make sure the Finder menus are on the menu bar.
2. Hold down the Command key and the Option key together.
3. Without releasing the two keys, insert the unlocked floppy disk.
4. When the dialog box asks you if you want to rebuild the Desktop file, click Yes.

**Warning:** If the floppy disk is infected, and you cancel the operation at this point, you will infect your system.



## Adobe Illustrator: Macintosh Compatibility

You may experience problems in using the color features of Adobe Illustrator 88 Version 1.6 on a Macintosh IIfx, IIfx, IIfx, or SE/30 computer. This is due to the Version 1.6 interpretation of the information returned by the SysEnvirons call. Adobe Illustrator 88 Version 1.8.3, which was distributed to all registered Adobe Illustrator 88 owners, corrects the problem; however, if your Macintosh has more than 1MB of RAM, you should upgrade to Illustrator 88 Version 1.9.3.

For information on how to obtain the upgrade, contact Adobe Systems at the following address:

Adobe Systems Incorporated  
P.O. Box 7900  
Mountain View, CA 94039-7900  
(415) 961-4400 or 1-800-833-6687



# THINK Pascal and the Macintosh Portable

Symantec offers a simple patch to make THINK Pascal work properly with the Macintosh Portable. You can download the patch from AppleLink® (path: Third-Party Connection: Third-Party Software Updates: Symantec: THINK Pascal 2.03) or from CompuServe. Or you can send a self-addressed, stamped envelope and a disk (or a check for \$10) to Symantec at the following address:

Symantec Corporation  
135 South Road  
Bedford, MA 01730



# Lasertalk, PostScript, and the LaserWriter

Lasertalk, from Emerald City Software, is an interactive PostScript® development environment for the Macintosh. This application helps PostScript programmers develop, modify, maintain, and execute PostScript code. In some respects, Lasertalk can also be considered a specialized terminal package for interacting with a LaserWriter® printer through the AppleTalk network system. Although PostScript programmers can access a LaserWriter in interactive mode with a standard terminal package, Lasertalk offers the following additional advantages:

- The ability to communicate with the LaserWriter through the AppleTalk network, offering more flexibility than the direct serial connection required by a standard terminal package.
- On-line documentation for the PostScript language. An abridged version of the information in Addison-Wesley's *PostScript Language Reference Manual*, the documentation is particularly valuable to beginning PostScript programmers.
- A built-in text editor with find and replace commands, auto-indentation, and commands for formatting PostScript source code.
- The ability to interactively step and trace through each line of executing PostScript code.
- A status window, for displaying values of PostScript stacks and variables.
- The ability to preview the image being formed in the LaserWriter.
- A PostScript dictionary browser, which allows the programmer to inspect dictionaries activated in the printer.
- Support for downloading entire PostScript files to the LaserWriter printer. Such files can be created manually in any text editor, or with a PostScript graphics package such as Aldus FreeHand or Adobe Illustrator.

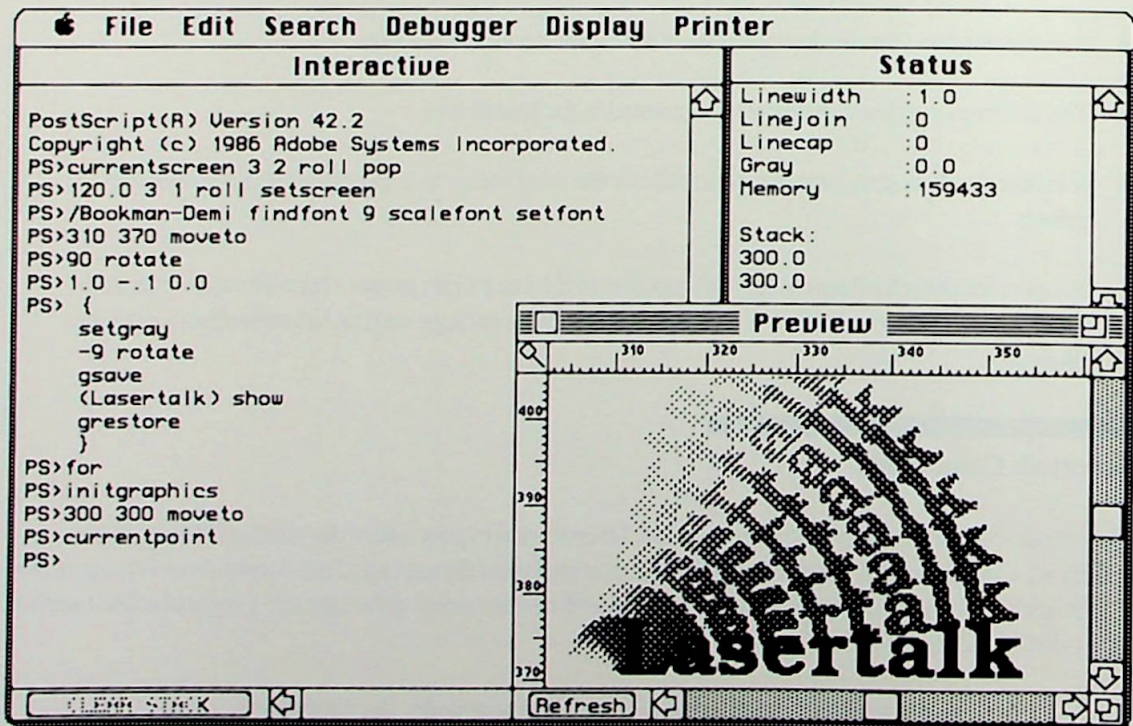
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## Lasertalk Commands

Despite the technical nature of this application, Lasertalk makes good use of the standard Macintosh user interface. Commands for controlling the application are issued through standard Macintosh pull-down menus. Commands for controlling or programming the LaserWriter are issued either through a command line interface or by downloading PostScript files to the LaserWriter.

- In addition to the About Lasertalk menu item and desk accessories, the Apple menu contains a PS Operators item that offers convenient access to the on-line reference to standard PostScript operators.

- The File menu offers the standard Macintosh command options—New, Open, Close, Save, Save As, Revert, Page Setup, Print, and Quit—for the PostScript code files that Lasertalk creates or opens.
- The Edit menu, which provides the standard Macintosh Edit menu items, also features Shift Left and Shift Right commands that help you adjust code indentation depth for several lines at once. The Format command helps format PostScript code, making it more readable, and the Preferences command allows you to make various Lasertalk environment settings.
- The Search menu contains several menu items common to Macintosh text editors, including Find, Find Again, Replace, Replace and Find Again, Replace All, Go to Top, and Go to Bottom. Two unusual commands are also featured: Dictionary Lookup, which determines the value of a PostScript operator and in which dictionary it resides, and Documentation Search, which provides access to the same on-line reference information you can access through the PS Operators item in the Apple menu.
- A Debugger menu features Reset, Trace, and Step, each of which is used during controlled execution of a PostScript code segment. The Clear Stack option resets the dictionary stack in the LaserWriter, leaving only User and System Dictionaries on the dictionary stack.



- The Display menu provides access to windows for the functional components of Lasertalk, which include the following:
  - The Interactive Window provides direct access to the LaserWriter in interactive mode with a command line interface. You can think of it as a terminal screen to the LaserWriter.
  - The Status Window displays information on user-selectable stacks, dictionaries, and variables.
  - The Preview Window allows you to view an image being formed in the LaserWriter.
  - The Dictionary Browser allows you to explore the PostScript dictionaries open on the LaserWriter dictionary stack.
  - The Lookup Window displays values for dictionary components.
  - The Documentation Window offers an abridged version of the information in Addison-Wesley's *PostScript Language Reference Manual*.
- The Printer menu features a menu item that alternates between Disconnect and Connect. To initiate a connection, the user chooses Connect, and the item changes to Disconnect. When interacting with a LaserWriter, Lasertalk completely takes over the printer; other network entities cannot access the printer while Lasertalk has the printer in interactive mode. Disconnect releases the LaserWriter for normal use. Another Printer menu command, Download, allows you to download PostScript files to the LaserWriter in the same way you transfer a file from one computer to another with a typical communications package. (However, the LaserWriter executes the PostScript file as it receives the file.)

PostScript is a very powerful page description language, and some of its more advanced capabilities are not tapped by even the most advanced PostScript-based graphics packages for the Macintosh. Those who become proficient at programming in PostScript can use Lasertalk to take advantage of everything PostScript has to offer. Although you may prefer to use a PostScript-based graphics editor—such as Illustrator 88 from Adobe, or FreeHand from Aldus—to create page images, you can use Lasertalk for adding special effects. For example, FreeHand 2.0 allows you to add custom fill and line types by providing FreeHand with the PostScript code that defines custom fills or lines. Also, Microsoft Word allows you to insert PostScript code into your word-processed documents. Lasertalk can be most helpful in writing and debugging such PostScript code segments.

Lasertalk is also a useful LaserWriter tool. Most advanced Macintosh users would contend that utilities such as ResEdit, FEdit Plus, and SUM are needed because they allow you to explore, customize, and repair data on a hard disk. Lasertalk can provide similar functions for a LaserWriter. Normally, PostScript programs are used to define an image on the page. However, PostScript can also be used to inquire about—or make changes to—values for LaserWriter hardware such as network name, node type, printer password, communication settings, and emulation mode. For example, the Namer utility that comes with each LaserWriter changes a printer's name by issuing a PostScript code segment to the LaserWriter. The AppleShare Print Server also changes the network node setting with a PostScript code sequence. Lasertalk can be used to write and send such PostScript programs to a LaserWriter.

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### System Requirements

Lasertalk requires a Macintosh Plus computer (or greater), two floppy disk drives or a floppy disk drive and a hard disk, and a LaserWriter or comparable PostScript printer connected via AppleTalk. You must use the Macintosh System Software Version 4.1 (or greater).

For further information about Lasertalk, contact the publisher at the following address:

Emerald City Software  
P.O. Box 2103  
Menlo Park, CA 94026  
(415) 368-8303



# HyperCard CD Audio Toolkit

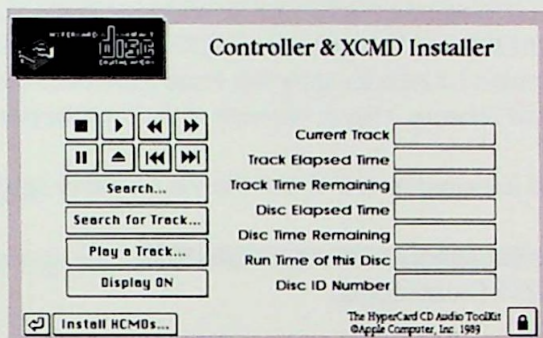
The HyperCard CD Audio Toolkit, available from APDA™ (the Apple Programmers and Developers Association), is a set of extensions that gives HyperCard users control over, interaction with, and random access to audio tracks on any compact disc.

Designed for use with the AppleCD SC® drive, the CD Audio Toolkit lets developers and users add the sound quality of CD audio to presentations, courseware, and other interactive applications. It includes external commands (XCMDs) and external functions (XFCNs) that provide simple to advanced control of CD audio tracks to 1/75th of a second—accessing the full range of control and status information from the AppleCD SC drive. The extensions also allow sharing of disc, track, and program information between the HyperCard application and the AppleCD Remote desk accessory.

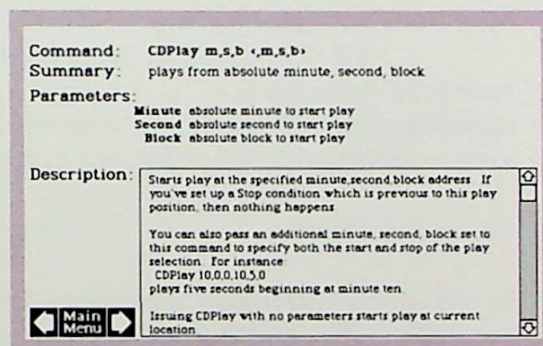
The toolkit comes with an assortment of sample stacks. It requires HyperCard Version 1.2 (or greater), the Macintosh System Software Version 6.0.2 (or greater), and the AppleCD SC Setup Tools Version 2.0.1 (or greater). Developers must license the extensions for distribution.

For ordering information, contact APDA at the address below:

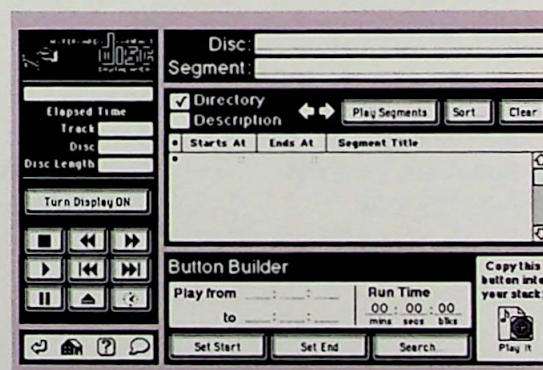
APDA  
Apple Computer, Inc.  
20525 Mariani Avenue, M/S 33G  
Cupertino, CA 95014  
1-800-282-2732 (United States)  
1-800-637-0029 (Canada)  
AppleLink: APDA



*The HyperCard CD Audio Toolkit Controller and XCMD Installer stack gives you direct control of CD Audio tracks from within HyperCard.*



*The Toolkit comes with a documentation stack providing detailed information for each command.*



*The CD Editor example, included with the toolkit, features a "button builder", which you can use to play your favorite snippets of CD-ROM audio. Use this stack to automatically create a button—easily pasted into other stacks—that will play arbitrary portions of audio tracks from CD-ROM's.*

## CL/1 Update

CL/1™ Version 1.1, scheduled for release on March 31, 1990, provides new functionality in CL/1 connectivity to IBM MVS and VM systems, and 3270 connectivity to the Macintosh personal computer. In addition, CL/1 Version 1.1 includes AppleTalk Phase 2 and enhances the ability of AppleTalk to connect to Digital VAX/VMS™ systems. (For an overview of CL/1, see the January 1990 issue of the *Macintosh Technical Bulletin*.)

All registered owners of CL/1 Version 1.0 will be sent Version 1.1 free of charge.

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### 3270 Connections

CL/1 supports 3270 connections on Macintosh systems equipped with hardware that implements the Apple 3270 API via Apple's MacDFT® software or selected third-party solutions.

- Apple MacDFT-compliant hardware:

Apple Coax/Twinax Card  
Apple TokenTalk® NB Card  
Apple Serial NB Card

- Third-party hardware:

Tri-Data Netway 1000, Netway 2000 (uses the Tri-Data API, an implementation of the Apple 3270 API)  
Avatar 3270 cards running MacMainFrame Version 3.1 or later  
DCA MacIRMA cards running MacIRMA WorkStation 1.0

These capabilities are included with CL/1 Version 1.1. Contact the vendors for information about current API and 3270 emulation software.

Tri-Data Systems, Inc.  
3270 Scott Blvd.  
Santa Clara, CA 95054  
(408) 727-3270

Avatar, Inc.  
65 South Street  
Hopkinton, MA 01748  
(508) 435-3000

DCA, Inc.  
1000 Alderman Drive  
Alpharetta, GA 30201  
(404) 442-4000

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## Supported Software

The following software versions are supported by CL/1 Version 1.1.

| <u>Product</u>                         | <u>Version</u>                                      |
|--|---|
| VAX/VMS                                | 5.0 through 5.3                                     |
| CL/1 Server for VAX/VMS                | 1.1   |
| AppleTalk for VMS                      | 2.1   |
| Oracle for VAX/VMS                     | 5.1.22 through 6.0                                  |
| Sybase for VAX/VMS                     | 3.0.1 through 3.2                                   |
| Informix for VAX/VMS                   | 2.10.04   |
| Ingres for VAX/VMS                     | 6.1/02 (with patch applied) through 6.2             |
| Rdb                                    | 3.0 (beta 3.1 is not supported at this time)        |
| <br>                                   |   |
| MVS/XA-TSO                             | 2.2 or any version that supports DB2 2.1 or greater |
| MVS/ESA-TSO                            | Any version that supports DB2 2.1 or greater        |
| CL/1 Server for MVS/TSO                | 1.1   |
| DB2                                    | 2.1 or greater                                      |
| <br>                                   |   |
| VM/SP - CMS                            | Any version that supports SQL/DS 2.1 or greater     |
| VM/SP XA - CMS                         | Any version that supports SQL/DS 2.1 or greater     |
| CL/1 Server for VM/CMS                 | 1.1   |
| SQL/DS                                 | 2.1 or greater                                      |
| <br>                                   |   |
| A/UX® Operating System                 | 1.0–1.1.1   |
| CL/1 Server for A/UX                   | 1.085.01 (this is a beta product)                   |
| Informix for A/UX                      | 2.10.04   |
| <br>                                   |   |
| Macintosh System Software              | 6.0.2–6.0.4   |
| HyperCard                              | 1.2.2–1.2.5   |
| CL/1 Developer's Toolkit for Macintosh | 1.1   |
| ADSP                                   | 1.0   |
| MacDFT                                 | 1.1   |
| MPW® C Objects                         | 2.0–3.0   |
| MPW Pascal Objects                     | 2.0–3.0   |
| THINK C Objects                        | 3.0   |



## More Information on CL/1

### Compatibility with CL/1 Beta Version 1.084.00 and Earlier Software

The CL/1 Developer's Toolkit for the Macintosh release 1.084.00 (and earlier) uses different System file resource names from those used by releases 1.085.xx, 1.0, and 1.1. Installation of the newer releases will not automatically replace or remove the earlier versions and their resources. The Installer supplied with the CL/1 Developer's Toolkit for the Macintosh release 1.084.00 (and earlier) must be used to remove these now unneeded resources.

Only applications that run with CL/1 for Macintosh Version 1.085.xx are compatible with CL/1 for Macintosh Version 1.0 and greater.



### Apple Developer University Training

Apple Developer University is offering a three-day course titled "CL/1 Fundamentals." The course includes:

- CL/1 programming
- An overview of DBMS technology
- An overview of CL/1 applications

Attendees will gain basic CL/1 knowledge, programming skills, and insights into the power of CL/1 as a corporate information retrieval tool. The fee for the course is \$900; lunch is included. Maximum class size is 15. Classes are scheduled as follows:

|                |               |                  |               |
|----------------|---------------|------------------|---------------|
| January 22-24  | Cupertino, CA | June 12-14       | Charlotte, NC |
| February 12-14 | Cupertino, CA | June 26-28       | Cupertino, CA |
| March 19-21    | Cupertino, CA | July 31-August 2 | Cupertino, CA |
| April 17-19    | Tampa, FL     | September 18-20  | Chicago, IL   |
| May 1-3        | Cupertino, CA |                  |               |

To register or for more information, contact:  
Developer University Registrar  
Apple Computer, Inc.  
20525 Mariani Avenue, M/S 75-2B  
Cupertino, CA 95014  
AppleLink: DEVUNIV  
(408) 974-6215



## Macintosh II High-Resolution Display Video Card

The Macintosh II High-Resolution Display Video Card provides RS-343 and RS-170 video signals. RS-343 is the default video signal for the Macintosh computers, and RS-170 is the interlaced standard for low-resolution monitors and black-and-white television. An example of a monitor that will support the RS-170 signal is the Apple II RGB monitor and video cable.

To facilitate the switching between the two signals, the card provides a feature that detects either a low (ground) or high (no connect) signal on the connector.

For DB-15 connectors, sense lines are located on pins 4, 7, and 10. However, the Macintosh II High-Resolution Display Video Card presents a special case; it senses only a high or low signal on pin 4 of the DB-15 connector.

The following list provides the minimum configuration of pins that must connect the Macintosh II High-Resolution Display Video Card to the Apple High-Resolution Monochrome Monitor and the AppleColor High-Resolution RGB Monitor.

| Pin   | Video Card Signal                      | Apple High-Resolution Monochrome Monitor | AppleColor High-Resolution RGB Monitor |
|-------|--|--|--|
| 1     | Red video ground                       | 1  | 1                                      |
| 2     | Analog red video                       | 2  | 2                                      |
| 3     | TTL composite sync                     | 3  | 3                                      |
| 4     | Sense 0                                | 4  | 4                                      |
| 5     | Analog green video with composite sync | 5  | 5                                      |
| 6     | Green video ground                     | 6  | 6                                      |
| 7     | Sense 1 (not used)                     |  |  |
| 8     | NC                                     |  |  |
| 9     | Analog blue video                      | 9  | 9                                      |
| 10    | Sense 2 (not used)                     |  |  |
| 11    | Ground                                 |  |  |
| 12    | NC                                     |  |  |
| 13    | Blue video ground                      | 13                                       | 13                                     |
| 14    | Ground                                 |  |  |
| 15    | NC                                     |  |  |
| Shell | Earth ground                           | Shell                                    | Shell                                  |

When Sense 0 (pin 4) is grounded, the card generates an RS-343 video signal, which is compatible with the Apple High-Resolution Monochrome and High-Resolution RGB monitors. The RS-343 signal has the following characteristics:

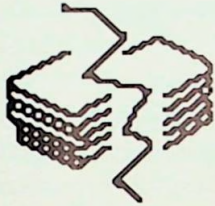
- Horizontal scanning = 35.000 KHz
- Dot clock = 30.24 MHz
- Vertical scanning = 66.67 Hz

When Sense 0 (pin 4) is not connected, the card generates an RS-170 video signal. This can occur when some third-party monitors or cables are used, and this signal may not be the correct signal for your display. The RS-170 signal has the following characteristics:

- Horizontal scanning = 15.734 KHz
- Dot clock = 12.27 MHz
- Vertical scanning = 60.0 Hz



## Preventing HyperCard Stack Corruption



When the HyperCard application suddenly cannot open a particular stack, or cannot access certain cards in the stack, you'll see one of the following stack corruption messages before the application quits:

Can't read card or bkgnd id <an ID number> at  
location <another number>

Can't open stack

Because the primary cause of such corruption is interruption of the program in mid-execution, you can take steps to prevent it. The interruption could result from a system crash, an XCMD crash, a HyperCard Unexpected Error, the power being turned off, the Macintosh being restarted from Macsbug, or the machine being restarted with the programmer's switch. HyperCard writes data to disk whenever it has the opportunity; however, if an operation is interrupted, there is a good chance that there will be data in RAM, and that the disk file will contain some internal inconsistencies.

There is little you can do about a system crash or an error caused by HyperCard itself. However, if you restart your machine because a script takes a long time to run, or because a file server seems extra slow, you may damage the stack. When a HyperTalk® script is running, cancel it by pressing Command-period or wait until it's finished.

If you experience a crash when you run a stack that calls XCMDs or XFCNs, comment out the call to the external and see if the crash still occurs. If you're the author, back up your stack and continue testing to uncover the source of the bug.

Following are a few precautions that may be helpful in avoiding stack corruption:

- When you're working on a stack, periodically save copies. If something goes wrong, you'll lose only a small amount of work instead of an entire stack.
- Compact your stacks frequently, especially if they constantly accumulate free space. Compacting will almost always detect stack corruption and save you from putting further effort into a damaged stack.
- Be sure that you're using the most current version of HyperCard (Version 1.2.2, except for users of System Software Version 6.0.4 or the Macintosh IIci or Portable computer, who must use HyperCard Version 1.2.5). You can get the current version from your authorized Apple dealer or your Apple sales representative.



### AppleLink and TrafficWatch

You may get a serial port error when you start up AppleLink after running Farallon's TrafficWatch to track down network problems.

To fix the problem, install the ImageWriter® printer driver (from the Printing Tools disk) into the System Folder and use the Chooser to initialize both serial ports. Then remove the ImageWriter driver, reboot, and start up AppleLink.



## LaserWriter "Ghosts": Some Causes and Tips for Elimination

Ghosting—a dark or light residual image from a previous print job in the solid areas of output copy—is a problem that sometimes occurs with the xerographic process used in LaserWriter printers. The problem is most commonly related to the image developer system, and can be minimized by increasing the copy density level (turning the print density dial counter-clockwise) or by running several pages of the desired document. (By the third copy, the ghost image is usually reduced to acceptable levels.)



### Causes of Ghosting

The xerographic process used in the LaserWriter printer involves two sources of ghost images:

- Latent image on the developer cylinder
- Latent image on the photosensitive drum

The image developer system is the more common source of ghosting. Darker ghosts are caused when toner left unused on the developer cylinder doesn't adequately develop the electrostatic image on the photosensitive drum. Such reduced development capability first produces a lighter image. Once the leftover toner is replaced by more active toner from the toner supply bin, the image becomes noticeably thicker and darker. (You may notice this effect when a solid-black page prints after the machine is allowed to sit unused for several minutes; the first two inches or so—one revolution of the developing cylinder—of the image will be lighter than the rest of the page.)

When an image is created from the less active toner on the developer cylinder, images formed on subsequent revolutions of the developer cylinder will be made of a combination of the more active and less active toners. These later images will be dark where they are made by the active toner and lighter where the less active toner remains. You may see a dark ghost image approximately two inches from the original image. As you continue to print, more and more of the active toner replaces the less active toner, and you'll notice that ghosting decreases. You can further diminish the visual effect of dark developer ghosting by increasing the print density.

The lighter form of developer system ghosting is caused by insufficient toner in the toner bin. It usually occurs when the toner supply in the cartridge gets low. When insufficient toner remains in the bin, a light ghost may appear in the solid areas of the output copy. Take the cartridge out, rock it gently back and forth a few times to redistribute the toner, and reinsert it.

The less prevalent source of ghosting—a latent image on the photosensitive drum—results from failure of the cleaning system to remove a toner image from the drum, or failure of the drum preconditioning system to remove the electrostatic image from the drum. It is also possible to “burn” an image into a drum by exposing the drum, which has a toner image on the surface, to bright light for a long enough period of time. (Shields over the drum and exposure slots on the cartridge minimize this possibility.) Latent images then transfer to the output copy at a point approximately 3.75 inches (one drum revolution) from the original image.

You can minimize the likelihood of such problems by keeping toner cartridges out of open, lighted areas. When a cartridge is not installed, store it in the mylar bag from the cartridge packaging.



## 68030-Based Macintosh: MIDI and SCC Chip Registers

Some users of 68030-based Macintosh systems (Macintosh IIx and later models) report that when they use the computer with a MIDI interface, the Macintosh sends a constant stream of data from the serial port, affecting the MIDI setup and creating a jam that causes the MIDI devices and software to crash.

This issue centers on the SCC chip power-on configuration. In Macintosh computers that do not have the 68030 microprocessor, the contents of a particular register of the SCC chip have a power-on default of zero. (Note that this register is the only one discussed in this article; however, there are other registers in the SCC.) In the Macintosh IIx and later models, the register's power-on state may be set to something other than zero—an event that occurs randomly—and this may cause the serial port data stream symptoms discussed above. If your computer exhibits such symptoms, an INIT from Opcode—available in the public domain and through on-line services—ensures that the Macintosh SCC register is set to zero at boot time. However, certain sequences of events may still reset the register of the SCC after booting.

For example, with the Opcode INIT in the System Folder, the following situations can occur:

- If you print after powering on and before you use a MIDI application, the SCC register may have an incorrect setting for MIDI. If you don't print before you launch a MIDI program, you should have no difficulty with MIDI programs.
- If AppleTalk is turned on before you use MIDI, the SCC registers are likely to change and may cause lockups of MIDI devices. This may happen whether AppleTalk is off at startup and is then turned on and turned off, or AppleTalk is on at startup and is then turned off. If you restart with AppleTalk off, and if you don't activate AppleTalk before you use MIDI, the MIDI session should run smoothly. (Users have reported that Font/DA Juggler and Master Juggler occasionally turn on AppleTalk.)

Many publishers of MIDI applications have updated their software to accommodate the SCC register problem by including code that addresses this issue in their startup routines. If you experience the symptoms described in this article, contact the publisher of your MIDI application to find out whether your version of the software contains the code. If the publisher has not yet revised its program, obtain the Opcode INIT and place it in your System Folder. When you are going to be using MIDI, reboot your Macintosh first, then run your MIDI programs.

Apple's MIDI Management Tools software provides a set of Toolbox calls that allow developers to communicate to the serial ports without directly addressing the SCC chip. Since the MIDI Management Tools are a recent development, most existing MIDI programs still talk to the hardware directly. MIDI applications that *do* support Apple's MIDI Management Tools software require Version 1.2 of the software to avoid the SCC register problem experienced on the 68030 machines.

MIDI Management Tools Version 1.2 is a new release that also provides compatibility with the Macintosh Portable and Macintosh IIci computers. No new functionality or features were added over Version 1.1. For ordering information, contact APDA at the following address:

APDA  
Apple Computer, Inc.  
20525 Mariani Avenue, M/S 33G  
Cupertino, CA 95014  
1-800-282-2732 (United States)  
1-800-637-0029 (Canada)  
AppleLink: APDA



## Apple/Quantum Hard Disk Drive Solution

Some users have reported problems with the Quantum 40-megabyte and 80-megabyte 3.5-inch hard disk drives in Apple products. Apple and Quantum Corporation have investigated the reports and the problem has been corrected in current hard disk drive production.

However, if you experience either of the following symptoms with your Apple hard disk drive, you may be eligible for a solution through a repair extension program.





- Periodic failure of the system to boot. You see a floppy disk icon with a flashing question mark. If you turn the system off and then on, booting usually proceeds properly.
- Appearance of a dialog box that states "Cannot load Finder." Although this symptom is less common, it responds to the same workaround: If you turn the system off and then on again, the system resumes normal operation.






If your hard disk drive exhibits these symptoms, contact an authorized Apple service provider to determine whether the product needs service and whether you are eligible for the Apple/Quantum repair extension program, offered for a two-year period ending October 31, 1991.




Customers who have paid for exchange of an out-of-warranty 40-megabyte or 80-megabyte disk drive since April 1, 1989, may be entitled to reimbursement from Apple. Please contact Apple Customer Relations at (408) 252-2775 for further information.



# Macintosh System Software Compatibility and Configuration

| CPUs  | Macintosh System Software Compatibility and Configuration   |
|---|---|
|  <p><b>Macintosh 128K</b></p>            | <ul style="list-style-type: none"> <li>• Currently ships with: Product no longer available from Apple.</li> <li>• Supports: System Software 2.0 and Finder 4.1.</li> <li>• Recommended: System Software 2.0 and Finder 4.1.</li> <li>• For AppleShare: Cannot be used as an AppleShare file server or workstation.</li> </ul>   |
|  <p><b>Macintosh XL</b></p>              | <ul style="list-style-type: none"> <li>• Currently ships with: Product no longer available from Apple.</li> <li>• Supports: System Software 1.0 and System Software 1.1.</li> <li>• Recommended: System Software 1.1.</li> <li>• For AppleShare: Cannot be used as an AppleShare file server or workstation.</li> </ul>   |
|  <p><b>Macintosh 512K</b></p>          | <ul style="list-style-type: none"> <li>• Currently ships with: Product no longer available from Apple.</li> <li>• Supports: System Software 1.0 and System Software 1.1.</li> <li>• Recommended: System Software 1.1.</li> <li>• For AppleShare: The Macintosh 512K cannot use the AppleShare 2.0 workstation software. You can still use the AppleShare workstation software Version 1.1 with a file server that uses AppleShare File Server 2.0, although you will not be able to take advantage of the new features of AppleShare File Server 2.0. System Software 3.3 and Finder 5.5 are installed by the AppleShare 1.1 Workstation Installer disk.</li> </ul> |
|  <p><b>Macintosh 512K Enhanced</b></p> | <ul style="list-style-type: none"> <li>• Currently ships with: Product no longer available from Apple.</li> <li>• Supports: System Software 1.0, System Software 1.1, System Software 2.0, and System Software 2.0.1.</li> <li>• Recommended: System Software 2.0.1.</li> <li>• For AppleShare: System Software 3.3 and Finder 5.5 are installed by the AppleShare 1.1 Workstation Installer disk; System Software 3.4 and Finder 6.1 are installed by the AppleShare 2.0 Macintosh 512K Enhanced Workstation Installer disk. This machine cannot be used as an AppleShare file server.</li> </ul>  |

| CPUs   | Macintosh System Software Compatibility and Configuration  |
|--|--|
|  <p>Macintosh Plus</p>    | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 1.0 through System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.2 or later.</li> <li>• For AppleShare: System Software 2.0 or later; System Software 6.0.2 or later is recommended.</li> </ul>             |
|  <p>Macintosh SE</p>      | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 2.0 through System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.2 or later.</li> <li>• For AppleShare: System Software 2.0 or later; System Software 6.0.2 or later is recommended.</li> </ul>             |
|  <p>Macintosh SE/30</p> | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 6.0.3 and System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.3 or later.</li> <li>• For AppleShare: System Software 6.0.3 or later.</li> </ul>  |
|  <p>Macintosh II</p>    | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4. from Apple.</li> <li>• Supports: System Software 2.0 through System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.2 or later.</li> <li>• For AppleShare: System Software 2.0 or later; System Software 6.0.2 or later is recommended.</li> </ul> |
|  <p>Macintosh IIx</p>   | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 6.0.3 and System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.3 or later.</li> <li>• For AppleShare: System Software 6.0.3 or later.</li> </ul>  |

| CPUs  | Macintosh System Software Compatibility and Configuration  |
|---|--|
|  <p>Macintosh IIcx</p>     | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 6.0.3 and System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.3 or later.</li> <li>• For AppleShare: System 6.0.3 or later.</li> </ul> |
|  <p>Macintosh Portable</p> | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.4.</li> <li>• For AppleShare: System Software 6.0.4.</li> </ul>                                    |
|  <p>Macintosh IIci</p>   | <ul style="list-style-type: none"> <li>• Currently ships with: System Software 6.0.4.</li> <li>• Supports: System Software 6.0.4.</li> <li>• Recommended: System Software 6.0.4.</li> <li>• For AppleShare: System Software 6.0.4.</li> </ul>                                    |

| System and Finder versions of System Software releases: |                |                |
|---|----------------|----------------|
| Release   | System Version | Finder Version |
| System Software 1.0                                     | System 3.2     | Finder 5.3     |
| System Software 1.1                                     | System 3.2     | Finder 5.3     |
| System Software 2.0                                     | System 4.1     | Finder 5.5     |
| System Software 2.0.1                                   | System 4.1     | Finder 5.5     |
| System Software 5.0                                     | System 4.2     | Finder 6.0     |
| System Software 5.1                                     | System 4.3     | Finder 6.0     |
| System Software 6.0                                     | System 6.0     | Finder 6.1     |
| System Software 6.0.2                                   | System 6.0.2   | Finder 6.1     |
| System Software 6.0.3                                   | System 6.0.3   | Finder 6.1     |
| System Software 6.0.4                                   | System 6.0.4   | Finder 6.1.4   |



# Current Macintosh Software, Hardware, and Upgrades

## Macintosh Upgrades

|                                     | Macintosh Plus | Macintosh SE | Macintosh SE/30 | Macintosh II | Macintosh IIx | Macintosh IIfx | Macintosh IIfx | Macintosh Portable |
|-------------------------------------|----------------|--------------|-----------------|--------------|---------------|----------------|----------------|--------------------|
| 68851 PMMU                          |                |              | •               |              |               |                |                |                    |
| Macintosh SE/30 Logic Board Upgrade | •              |              |                 |              |               |                |                |                    |
| Macintosh IIfx Logic Board Upgrade  |                |              | •               |              |               |                |                |                    |
| Macintosh IIfx                      |                |              |                 | •            |               |                |                |                    |
| 1MB Memory Exp Kit                  |                | •            | •               | •            | •             | •              | •              | •                  |
| 2MB Memory Exp Kit                  | •              | •            |                 |              |               |                |                |                    |
| 4MB Memory Exp Kit                  |                | •            | •               | •            | •             | •              | •              |                    |
| 4MB Parity Memory Expansion Kit     |                |              |                 |              |               | • <sup>1</sup> |                |                    |
| EtherTalk® Interface Card           |                |              | •               | •            | •             | •              |                |                    |
| TokenTalk NB Card                   |                |              | •               | •            | •             | •              |                |                    |
| Coax/Twinax Card                    |                |              | •               | •            | •             | •              |                |                    |
| Serial NB Card                      |                |              | •               | •            | •             | •              |                |                    |
| Apple Personal Modem (1200 bps)     | •              | •            | •               | •            | •             | •              | •              | •                  |
| Apple Data Modem 2400               | •              | •            | •               | •            | •             | •              | •              | •                  |
| AppleFax™ Modem                     | •              | •            | •               | •            | •             | •              | •              | •                  |
| Macintosh Portable Data Modem 2400  |                |              |                 |              |               |                |                | •                  |
| Rechargeable Battery                |                |              |                 |              |               |                |                | •                  |
| External Battery Recharger          |                |              |                 |              |               |                |                | •                  |
| Numeric Keypad Module               |                |              |                 |              |               |                |                | •                  |

<sup>1</sup> The parity option for the Macintosh IIfx is available only at time of purchase; parity cannot be added to the Macintosh IIfx at a later date.

Logic Board Upgrades

Internal Memory

Network Cards

Modems

Portable Options

## Developer Software Tools

These tools can be ordered from APDA.  
Call 1-800-282-APDA.

|                                       |                 |
|---------------------------------------|-----------------|
| MacWorkStation™                       | • Version 3.1   |
| Macintosh Programmer's Workshop (MPW) | • Version 3.0   |
| MacAPPC™                              | • Version 1.1   |
| MacApp®                               | • Version 2.0b9 |
| Macintosh Allegro Common Lisp™        | • Version 1.3   |
| ResEdit                               | • Version 1.2   |
| Macsbug                               | • Version 6.1   |
| MPW C++                               | • Version 3.1d1 |
| CL/1 Server for VAX/VMS               | • Version 2.1   |

Many hardware upgrades have configuration prerequisites, and require installation by an authorized Apple service provider.

For complete information regarding any Apple upgrades or updates, contact your authorized Apple reseller or an Apple sales representative. For the location of the reseller nearest you, call 1-800-538-9696.

## Macintosh Drives

|  | Macintosh Plus | Macintosh SE   | Macintosh SE/30 | Macintosh II | Macintosh IIfx | Macintosh IIfx | Macintosh IIfx | Macintosh Portable |
|--|----------------|----------------|-----------------|--------------|----------------|----------------|----------------|--------------------|
| Macintosh Internal 800K Floppy Drive   | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh Internal 1.4MB SuperDrive    | •              |                | •               | •            |                |                |                |                    |
| Macintosh Internal Hard Disk 20SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh Internal Hard Disk 40SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh Internal Hard Disk 80SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh Internal Hard Disk 160SC     |                |                | •               | •            |                |                |                |                    |
| Macintosh Portable Int. Hard Disk 40SC |                |                |                 |              |                |                |                | •                  |
| Macintosh External 800K Floppy Drive   | •              | •              | •               |              | •              | •              | •              |                    |
| Macintosh External 1.4MB SuperDrive    |                | • <sup>1</sup> | •               |              | •              | •              | •              |                    |
| Macintosh External 5.25 PC Drive       |                | •              | •               | •            | •              | •              | •              |                    |
| Macintosh External Hard Disk 20SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh External Hard Disk 40SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh External Hard Disk 80SC      | •              | •              | •               | •            | •              | •              | •              |                    |
| Macintosh External Hard Disk 160SC     | •              | •              | •               | •            | •              | •              | •              |                    |
| AppleCD SC (CD-ROM Drive)              | •              | •              | •               | •            | •              | •              | •              |                    |
| Apple Tape Backup 40SC                 | •              | •              | •               | •            | •              | •              | •              |                    |

<sup>1</sup> Beginning in September 1989, all standard Macintosh SE computers have included the 1.4MB SuperDrive. Macintosh SE systems with the original floppy disk drives can be upgraded to include the SuperDrive. Until this upgrade is done, the external SuperDrive will NOT work with the older, 800K-based Macintosh SE.

## HyperCard

|           |  |
|-----------|--|
| HyperCard | <ul style="list-style-type: none"> <li>• Version 1.2.2 (with System 6.0.3 or earlier)</li> <li>• Version 1.2.5 (with System 6.0.4 or greater)</li> </ul> |
|-----------|--|

## Miscellaneous Peripheral Operating Software

|                        |   |
|------------------------|---|
| AppleFax Modem         | <ul style="list-style-type: none"> <li>• AppleFax Version 1.2 (with System 6.0.2 or greater)</li> <li>• AppleFax Version 1.1 (with System 5.2)</li> </ul>                 |
| AppleCD SC             | <ul style="list-style-type: none"> <li>• Macintosh CD Setup Version 2.0.1</li> <li>• Apple II CD Setup Version 1.0</li> <li>• Apple IIgs® CD Setup Version 1.1</li> </ul> |
| Apple Scanner          | <ul style="list-style-type: none"> <li>• AppleScan™ Version 1.02</li> <li>• HyperScan™ Version 1.0</li> </ul>   |
| Apple Tape Backup 40SC | <ul style="list-style-type: none"> <li>• Version 2.01</li> </ul>  |

## Networking and Communications Software

|                           |  |
|---------------------------|--|
| MacTerminal®              | <ul style="list-style-type: none"> <li>• Version 2.3.1</li> </ul>  |
| MacTCP®                   | <ul style="list-style-type: none"> <li>• Version 1.0</li> </ul>  |
| AppleShare                | <ul style="list-style-type: none"> <li>• AppleShare Print Server Version 2.0.1</li> <li>• AppleShare File Server Version 2.0.1</li> <li>• Apple II Setup Disk Version 2.1</li> </ul> |
| AppleShare PC             | <ul style="list-style-type: none"> <li>• Version 2.0</li> </ul>  |
| EtherTalk                 | <ul style="list-style-type: none"> <li>• Version 2.0</li> </ul>  |
| EtherTalk for A/UX        | <ul style="list-style-type: none"> <li>• Version 2.0</li> </ul>  |
| TokenTalk                 | <ul style="list-style-type: none"> <li>• Version 2.0</li> </ul>  |
| Apple File Exchange       | <ul style="list-style-type: none"> <li>• Version 1.1.2</li> </ul>  |
| Inter•Poll®               | <ul style="list-style-type: none"> <li>• Version 1.0.1 (with System 6.0.3 and greater)</li> </ul>  |
| AppleTalk Internet Router | <ul style="list-style-type: none"> <li>• Version 2.0</li> </ul>  |

## Macintosh II Monitors and Video Cards

|  | Macintosh II   | Macintosh IIx  | Macintosh IIcx | Macintosh IIfx |             |
|--|----------------|----------------|----------------|----------------|-------------|
| Apple Two-Page Monochrome Monitor (21 inches)        | • <sup>1</sup> | • <sup>1</sup> | • <sup>1</sup> | • <sup>1</sup> | Monitors    |
| Apple Macintosh Portrait Display (15 inches)         | • <sup>1</sup> | • <sup>1</sup> | • <sup>1</sup> | • <sup>2</sup> |             |
| AppleColor High-Resolution RGB Monitor (13 inches)   | • <sup>1</sup> | • <sup>1</sup> | • <sup>1</sup> | • <sup>2</sup> |             |
| Apple High-Resolution Monochrome Monitor (12 inches) | • <sup>1</sup> | • <sup>1</sup> | • <sup>1</sup> | • <sup>2</sup> |             |
| Macintosh II 1-bit Video Card                        | •              | •              | •              | •              | Video Cards |
| Macintosh II 4-bit Video Card                        | •              | •              | •              | •              |             |
| Macintosh II 8-bit Video Card                        | •              | •              | •              | •              |             |
| Macintosh II Portrait Display Video Card             | •              | •              | •              | •              |             |
| Macintosh II Two-Page Video Card                     | •              | •              | •              | •              |             |
| Macintosh II Video Card 4-bit Expansion Kit          | •              | •              | •              | •              | Other       |
| Apple Universal Monitor Stand                        | •              | •              | •              | •              |             |

<sup>1</sup> Requires installation of appropriate Apple video card or third-party equivalent.

<sup>2</sup> The Macintosh IIfx has a built-in video port, and therefore requires a video card only for the Apple Two-Page Monochrome Monitor. For complete information on the built-in video capabilities of the Macintosh IIfx, contact your authorized Apple reseller.

## Printer Software

|                  |   |   |
|------------------|---|---|
| LaserWriter      | <ul style="list-style-type: none"> <li>• Laser Prep 5.2</li> <li>• LaserWriter Driver 5.2<sup>1</sup></li> </ul>  | <ul style="list-style-type: none"> <li>• IIGS LaserWriter Driver 3.0</li> </ul>   |
| LaserWriter Plus | <ul style="list-style-type: none"> <li>• Laser Prep 5.2</li> <li>• LaserWriter Driver 5.2<sup>1</sup></li> </ul>  | <ul style="list-style-type: none"> <li>• IIGS LaserWriter Driver 3.0</li> </ul>   |
| LaserWriter IIsc | <ul style="list-style-type: none"> <li>• LaserWriter IIsc Driver 1.1</li> </ul>   |   |
| ImageWriter      | <ul style="list-style-type: none"> <li>• ImageWriter 2.7 (for direct-connect printers)</li> </ul>   |   |
| ImageWriter II   | <ul style="list-style-type: none"> <li>• AppleTalk Apple IIGS ImageWriter 3.0 (for AppleTalk-connected printers)</li> <li>• Apple IIGS ImageWriter 3.0 (for direct-connect printers)</li> </ul> | <ul style="list-style-type: none"> <li>• AppleTalk ImageWriter 2.7 (for AppleTalk-connected printers)</li> <li>• ImageWriter 2.7 (for direct-connect printers)</li> </ul>       |
| ImageWriter LQ   | <ul style="list-style-type: none"> <li>• AppleTalk Apple IIGS ImageWriter 3.0 (for AppleTalk-connected printers)</li> <li>• Apple IIGS ImageWriter 3.0 (for direct-connect printers)</li> </ul> | <ul style="list-style-type: none"> <li>• LQ AppleTalk ImageWriter 2.0 (for AppleTalk-connected printers)</li> <li>• LQ ImageWriter 2.0 (for direct-connect printers)</li> </ul> |

<sup>1</sup> LaserWriter 6.0 is available for support of color PostScript printers, and will improve halftone printing on monochrome PostScript devices. Contact an authorized Apple reseller for details.

## Printer Upgrades

|   | ImageWriter II | ImageWriter LQ | LaserWriter | LaserWriter Plus | LaserWriter IIsc | LaserWriter IIINT | LaserWriter IIINTX |                      |
|---|----------------|----------------|-------------|------------------|------------------|-------------------|--------------------|----------------------|
| ImageWriter® 32K Memory Option (Apple II only)          | •              | •              |             |                  |                  |                   |                    | Memory Expansion     |
| LaserWriter® IIINTX 1MB Mem Exp Kit                     |                |                |             |                  |                  |                   | •                  |                      |
| LaserWriter IIINTX 4MB Mem Exp Kit                      |                |                |             |                  |                  |                   | •                  |                      |
| LaserWriter Plus Kit (ROM Upgrade for LaserWriter)      |                |                | •           |                  |                  |                   |                    | Logic Board Upgrades |
| LaserWriter Plus Kit (ROM Upgrade for LaserWriter Plus) |                |                |             | •                |                  |                   |                    |                      |
| LaserWriter IIINT Controller Card                       |                |                |             |                  | •                |                   |                    |                      |
| LaserWriter IIINTX Controller Card                      |                |                |             |                  | •                | •                 |                    |                      |

# Current Apple Upgrades and Updates

An **upgrade** enhances features of existing hardware or software. Generally, an upgrade involves a fee, and any additional Apple hardware must be installed by an authorized Apple service provider.

A software **update** consists of enhancements, fixes, or patches to software. An update to Apple software is handled through an authorized Apple dealer or your Apple sales representative.

Following is a summary of the Apple upgrades and updates currently available for Macintosh products.

## Macintosh 128K, 512K Upgrade to Macintosh Plus

Owners of Macintosh 128K and Macintosh 512K computers can upgrade to the Macintosh Plus. The upgrade consists of the Macintosh Plus Disk Drive Kit (part number M2516) and the Macintosh Plus Logic Board Kit (part number M2518/A).

## Macintosh SE/30 Logic Board Upgrade

Owners of 1-megabyte or 4-megabyte Macintosh SE computers can upgrade to the Macintosh SE/30 by purchasing the Macintosh SE/30 Logic Board Upgrade (part number M0713). Owners who have a 2-megabyte or 2.5-megabyte Macintosh SE must purchase an additional 2 megabytes of memory to use the upgrade. One drive must be removed from systems that have two internal 800K drives. Macintosh System Software Version 6.0.3, required by the Macintosh SE/30, is included with the upgrade.

## Macintosh II Upgrades

The ROM upgrade for the Macintosh II enables the Macintosh II to recognize more than 1 megabyte of address space on a NuBus card.

Macintosh II users who want to achieve full system equivalence with the Macintosh IIfx system can do so by replacing the Macintosh II logic board with the Macintosh IIfx Logic Board Upgrade (part number M0271) and the FDHD Macintosh II Upgrade Kit (part number M6051).

Macintosh IIfx users who want to achieve full system equivalence with the Macintosh IIfx can do so by purchasing the Macintosh IIfx Upgrade Kit (part number M0295LL/A).

## LaserWriter II Upgrades

To upgrade the LaserWriter IIsc printer to the LaserWriter II<sub>NT</sub>, purchase the LaserWriter II<sub>NT</sub> Controller Card (part number M6009). To upgrade the LaserWriter IIsc or II<sub>NT</sub> to the LaserWriter II<sub>NTX</sub>, use the LaserWriter II<sub>NTX</sub> Controller Card (part number M6004).

## LaserWriter to LaserWriter Plus (LaserWriter Plus Kit)

To upgrade the LaserWriter printer to a LaserWriter Plus, an authorized Apple service provider installs 1 megabyte of ROM. The customer then installs the new screen fonts using the printer installation disk (supplied).

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### **LaserWriter PostScript Upgrade Program (LaserWriter Plus Kit)**

To upgrade LaserWriter Plus ROMs to PostScript version 47, an authorized Apple service provider installs the LaserWriter Plus Kit.

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### **LocalTalk PC Card ROM Upgrade**

Apple has revised the ROM on the LocalTalk® PC Card to upgrade the ROM Checksum. This upgrade improves compatibility with various software packages, and is available free of charge.

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### **AppleScan Version 1.0.2**

In addition to fixing a number of minor bugs, AppleScan 1.0.2 offers more control over Preview, improved compatibility with the AppleFax Modem, and improved transfer of PICT files. Version 1.0.2 of the AppleScan software is available free of charge.

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### **AppleFax Firmware Version 1.2**

AppleFax Firmware 1.2 fixes specific incompatibility problems with some Group 3 facsimile machines and certain phone systems, particularly Private Branch Exchange (PBX) phone systems. Version 1.2 of the AppleFax firmware is available free of charge.

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### **AppleFax Software Version 1.2**

Version 1.2 of the AppleFax Modem application and the AppleFax Modem Resource contains a number of improvements over Version 1.1, including compatibility with System Software 6.0.3, an end to "character collisions," and improved performance of the "in care of" feature. Version 1.2 of the AppleFax software is available free of charge.

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### **MacTerminal Version 2.3**

This MacTerminal software update is available free of charge. The new version features full MultiFinder software compatibility and an improved user interface.

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### **Claris Software**

For information about upgrades and updates to the Claris MacWrite, MacPaint, MacDraw, and MacProject programs, please contact:

Claris Corporation  
P.O. Box 526  
Santa Clara, CA 95052  
1-800-544-8554



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